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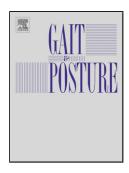
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Water depth effects on impact loading, kinematic and physiological variables during water

treadmill running.

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Highlights

Running gait was significantly altered with changes in water immersion depth

• Above waistline depths decreases variables associated with ground impact while

reducing physiological demand

Below waistline depths increases variables associated with force development at toe-

off while increasing physiological demand

Abstract

Purpose: The purpose of this study was to compare impact loading, kinematic and physiological

responses to three different immersion depths (mid-shin, mid-thigh, and xiphoid process) while

running at the same speed on a water based treadmill.

Methods: Participants (N=8) ran on a water treadmill at three depths for 3 minutes. Tri-axial

accelerometers were used to identify running dynamics plus measures associated with impact

loading rates, while heart rate data were logged to indicate physiological demand.

Results: Participants had greater peak impact accelerations (p<0.01), greater impact loading

rates (p<0.0001), greater stride frequency (p<0.05), shorter stride length (p<0.01), and greater

rate of acceleration development at toe-off (p<0.0001) for the mid-shin and mid-thigh

compared to running immersed to the xiphoid process. Physiological effort determined by heart

rate was also significantly less (p<0.0001) when running immersed to the xiphoid process.

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